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# INDUSTRIAL PROCESSES TO REDUCE GENERATION OF HAZARDOUS WASTE AT DOD FACILITIES

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## PHASE 3 REPORT SUMMARY OF PROJECTS OF EXCELLENCE WORKSHOPS

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prepared for the  
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Washington, D.C.

and  
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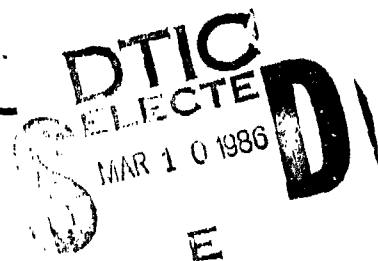
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and

**PEER CONSULTANTS, Inc.**

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December 1985



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## APPENDICES

- A. PLASTIC MEDIA PAINT STRIPPING, HILL AIR FORCE BASE,  
PROJECT OF EXCELLENCE WORKSHOP MATERIALS, 270 PP.,  
August 1985.
- B. INNOVATIVE HARD CHROME PLATING, PENSACOLA NAVAL AIR  
REWORK FACILITY, PROJECT OF EXCELLENCE WORKSHOP  
MATERIALS, 212 PP., September 1985.
- C. CENTRALIZED VEHICLE WASHRACKS AND SCHEDULED  
MAINTENANCE FACILITIES, FORT LEWIS, PROJECT OF  
EXCELLENCE WORKSHOP MATERIALS, 190 PP.,  
October 1985.

## 1. PROJECT OVERVIEW

### 1.1 Introduction

Prior to the twentieth century, the costs of waste disposal were borne by water consumers and paid for in disease and premature death. At the turn of the century, an understanding of the link between polluted water and disease and the adoption of water treatment led to a dramatic decline in the incidence of water-borne epidemics. Still, the costs of waste disposal were borne by water consumers, this time in the cost of water treatment.

Gradually, pressure was exerted to shift the burden from water consumers to the waste dischargers. Industries and communities were required to treat their wastes sufficiently to protect downstream users.

As our understanding of the long-term effects of (or at least our analytical capabilities for detecting) trace quantities of contaminants improved, increasingly stringent treatment requirements were placed on water and wastewater treatment plants. The logical result has been to shift the burden of compliance closer to the individual producers of toxic and hazardous wastes, since segregated concentrated wastes can be treated more efficiently before they are mixed or diluted.

Now that we are faced with the true costs of disposing of toxic and hazardous wastes, it has become increasingly evident that waste minimization is not just a legal requirement but an economic necessity. Waste minimization can be accomplished by the recovery and recycling of waste materials or preferably by modifying the industrial process to reduce or eliminate the production of the offending waste products.

### 1.2 Department of Defense Experience

The U.S. Department of Defense operates industrial facilities that repair and recondition planes, helicopters, ships, tanks, and other vehicles and equipment. At these facilities, paint stripping, solvent cleaning, metal plating, and painting are the industrial processes that produce most of DOD's hazardous wastes.

In May 1980, the Department of Defense issued policy memorandum DEQPPM 80-5, which charged the individual armed services with the responsibility to "where feasible, minimize quantities of hazardous wastes, through resource recovery, recycling, source separation, and acquisition policies." In August 1980, DOD policy memorandum DEQPPM 80-8 affirmed that DOD policy is:

- o "to limit the generation of hazardous waste through alternative procurement and operational procedures that are attractive environmentally yet are fiscally competitive,
- o to re-utilize, reclaim, or recycle resources where practical and thus conserve on total raw material usage..."

In carrying out the intent of these policies, numerous studies have been performed at DOD facilities. These studies recommended modifications to industrial processes to reduce the generation of hazardous wastes at the source, rather than treating the wastes at end-of-pipe treatment facilities. Many of the studies recommended process modifications with excellent cost/benefit ratios, and several of these modifications have been successfully implemented. However, many others have either not been implemented or were improperly applied.

### 1.3 Project to Reduce Hazardous Waste

In 1984, the DOD Environmental Leadership Project was established to study long-term environmental issues that have important cost and policy implications. Major tasks assigned to this office have been to assist with DOD's hazardous waste site cleanup program and to assist in promoting programs to reduce the future generation of hazardous wastes.

As part of this effort, the DOD Environmental Leadership Project awarded a contract to CH2M HILL and PEER Consultants through the Huntsville Division, U.S. Army Corps of Engineers, to study industrial process modifications implemented by the three armed services to reduce their generation of hazardous wastes. The objectives of this project were to develop techniques for promoting the adoption of process modifications, to integrate these techniques into operational programs, and to promote the future adoption of practical, cost-effective industrial process modifications that would reduce hazardous waste generation.

The project consisted of three phases. In Phase 1, 42 cases in which the services had attempted process modifications were studied. The results of this phase included an evaluation of which modifications had been successful, a description of the reasons for the success or failure of the modifications, and a ranking of the cases in order of their value as examples for further study. Criteria used to determine example value were the availability of information, the potential for waste reduction at the individual facility, the proportion of DOD-wide hazardous

waste involved, and the widespread applicability of the modification. A report compiled the results of the Phase 1 effort (1).

In Phase 2, the 18 cases with the highest example value were studied in more detail. This investigation included an evaluation of the factors that contributed to the success, or lack of success, of each modification. Factors used to quantify success included energy use, manpower requirements, material and capital costs, maintainability, reliability, simplicity, staff and management enthusiasm, and product impact. The cases were rated with a score that included example value and degree of success. A report prepared for Phase 2 included a review of the technologies available and detailed evaluations of the individual cases (2).

For Phase 3 of the project, three "Projects of Excellence" were selected. These had the highest combined score with regard to example value and degree of success. These three case studies were showcased through employee briefings and training workshops that highlighted the successful attributes of the Projects of Excellence.

The three cases selected as Projects of Excellence were:

- o Plastic Media Paint Stripping at Hill Air Force Base, Ogden, Utah
- o Innovative Hard Chrome Plating at Pensacola Naval Air Rework Facility, Pensacola, Florida
- o Centralized Vehicle Washracks and Scheduled Maintenance Facilities at Fort Lewis Army Post, Tacoma, Washington

This report is the third for this waste reduction project. It summarizes the results of the project, presents reviews of the workshops, and provides a source of materials prepared for the workshops in the appendices. This report concentrates on the Projects of Excellence, since other phases of the project as a whole are thoroughly discussed elsewhere (1), (2).

This introduction is followed by a discussion of the factors that contributed to the success of the Projects of Excellence and descriptions of the projects themselves. An overview and reviews of the workshops are also presented. Materials distributed during the workshops are provided in three separate volumes of appendices.

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## 2. PROJECTS OF EXCELLENCE

While there are specific circumstances and reasons behind the success, or lack of success, of each modification attempted, two elements have been an integral part of each of the successful process modifications. When one of these two elements was missing, the modifications were less than successful.

Very simply stated, in process modifications that were successfully implemented, the production people were sufficiently motivated to make the change, and the technologies were "elegant in their simplicity." Factors that motivated personnel included an improvement in production rate or quality, a reduction in overall costs, decreased manpower requirements, and a decrease in the quantity of hazardous wastes to be disposed of. Technologies that were elegant in their simplicity were easy to operate and maintain, reliable, and cost effective. Successfully implemented process modifications combined effective technology and motivated personnel to significantly reduce hazardous waste production.

In industrial process modifications that were successfully implemented, production people were enthusiastically and actively involved. This usually required that the modification result in some production benefit, such as reduced manpower requirements or simplification of the process. The change did not have an adverse effect on product quality, and it preferably had a beneficial effect on the end product. Care was taken to tailor the modification to the individual facility. During design and installation, operations and production personnel were asked to provide input in order to inspire them to adopt the process change.

A "champion" ramrodded the project, overcoming developmental problems and the inertia that protects existing processes (especially those that function, even though they may produce undesirable wastes).

Support was provided at a sufficiently high level in the chain of command to influence production and environmental policy decisions. Frequently, waste disposal and environmental protection had been viewed as service functions, subservient to the mission of the facility, which was usually production oriented. Successful modifications usually required the reallocation of resources from production functions to environmental protection functions. Allocation of manpower slots for environmental protection was particularly difficult to obtain.

The technologies tended to require "evolutionary" rather than "revolutionary" changes. That is, off-the-shelf

equipment was adapted to a new application, and special or complex equipment was avoided. Successful modifications were straightforward and simple to operate, requiring minimal training for personnel unfamiliar with the technology involved. Process reliability was high, and maintenance requirements were minimal.

Brief descriptions of each of the Projects of Excellence and the reasons why each was selected follow.

## 2.1 Plastic Media Paint Stripping at Hill Air Force Base

Paint stripping, in preparation for reconditioning and recoating, is performed at virtually every DOD industrial facility. In typical paint stripping, sprays or baths containing acidic methylene chloride or phenolic or hot alkaline sodium hydroxide solutions are employed to loosen and dissolve old paint. After the paint softens, the resulting solvent-paint mixture is scraped and brushed off. In addition, hard to remove paint is machine sanded, which often results in damage to the metal substrate.

The solvent-paint mixture falls to the floor, where it attacks the concrete and makes the floor slippery. The floor is frequently washed down with water to reduce this hazard. For a typical stripping operation on a fighter aircraft, tens of thousands of gallons of solvent-laden wastewater are generated.

Paint stripping produces a significant portion of the industrial wastewater at military aircraft repair facilities. Wet paint stripping is labor intensive and dirty and places a significant burden on waste treatment facilities.

Several alternative paint stripping processes have been studied by private industry and the military. Among these are dry media blasting, laser stripping, flash lamp stripping, water jet stripping, CO<sub>2</sub> pellet blasting, and cryogenics. The most promising of these techniques is dry media blasting using a recoverable plastic media. This technique was developed at Hill Air Force Base.

Conventional sand and glass bead blasting techniques have been used to remove paint and rust from metal surfaces. However, these paint removal techniques cannot be used for many military applications because hard abrasive media can damage aluminum and composite surfaces and delicate steel parts. In addition, sand and glass bead blasting produces a silicate dust that can cause silicosis, a respiratory ailment.

Soft vegetable media, such as walnut shells and rice hulls, have been successfully used to strip paint from metal surfaces. However, these materials are susceptible to biological growth during storage, are difficult to recycle, and degrade rapidly, producing large amounts of dust that can create an explosion hazard. In addition, the used media cannot be easily separated from the removed paint, which significantly increases the volume of hazardous waste that must be disposed of.

In plastic media stripping, small, angular plastic particles are air blasted at the painted surface, causing the coating to dislodge. The key parameter for the successful use of plastic media blasting is hardness. The paint must be softer than the plastic media, which, in turn, must be softer than the underlying substrate. Through careful control of the size of the particles and the conditions of the process, the plastic media can be separated from the loosened paint particles and recycled. Generation of wet hazardous waste (solvents and paint sludge in water) is completely eliminated. A small volume of dry hazardous waste is produced.

Stripping of thin-skinned aluminum, magnesium, fiberglass, and other composite surfaces requires skilled operators. These operators must carefully set and control several variables (e.g., media hardness, roughness, and size; blast pressure; standoff distance; application angle; nozzle size; and feed rate) so that surfaces are not damaged during stripping.

The development of the plastic media blasting technology at Hill Air Force Base is a clear example of the key elements that contribute to the successful implementation of a modification. The process itself is simple. Conventional sand blasting equipment was adapted to include media recovery and separation of the media from the waste paint chips and dust. The modification was championed by Mr. Robert Roberts, a staff member who recognized the environmental disadvantages of the existing methods used for stripping planes. He tried many processes before discovering, developing, implementing, and promoting dry plastic media.

Following extensive testing on aircraft components to demonstrate the effectiveness and safety of the process, personnel at Hill AFB stripped a complete F-4 fighter plane in July 1984. The aircraft was completely stripped in 40 manhours, versus 340 manhours required for wet paint stripping. This test demonstrated that the process is less labor-intensive than solvent stripping. In addition, greater control in stripping was achieved compared to that

achieved with wet paint stripping and sanding. This resulted in reduced damage to underlying surfaces.

A full-sized plastic bead blasting booth has been constructed based on the prospects of reduced manpower requirements and favorable environmental impact. The booth incorporates five blast positions, a live floor vacuum system to provide ventilation and dust removal, and a separation system for bead recovery and reuse. This booth was used to blast strip an F-4 aircraft in an elapsed time of 5.4 hours.

The new booth cost \$647,389 to purchase and install. Yearly savings are anticipated to be \$5,600,000, resulting in a 6-week payback period. A significant portion of this savings is attributable to a reduction in hazardous waste from the currently estimated 10,000 pounds of wet hazardous sludge per aircraft to 320 pounds of dry paint chips and decomposed plastic media per aircraft.

DOD estimated that more than \$100 million could be saved annually and that the generation of millions of gallons of hazardous wastewaters per day could be avoided by switching to plastic media paint stripping at all facilities.

Following successful demonstrations of the technology at Hill AFB, the Navy and the Army began to use plastic media on fixed-wing aircraft and helicopter components. Republic Airlines installed a plastic media paint stripping system in their repair facilities in Atlanta, in which they have successfully stripped the paint from more than 30 DC-9s. Plastic media paint stripping is rapidly becoming the state-of-the-art technology for paint stripping, with Hill AFB taking the lead.

## 2.2 Innovative Hard Chrome Plating at Pensacola Naval Air Rework Facility

"Plating" is defined as the deposition of a thin layer of metal on the surface of a basis metal for the purpose of changing the properties of the basis metal. Plating may be used to improve the appearance of the basis metal (decorative plating), to increase its resistance to corrosion, or to improve its engineering properties (hardness, durability, solderability, or frictional characteristics).

Chromium is used principally in the remanufacturing of worn parts whose replacement with new parts would be infeasible or uneconomical because of their unique design. Remanufacturing consists of machining the worn part or stripping a portion of the old plate, overplating it with a thick layer of chromium (hard chrome plating), and machining it back to original specifications. Parts are typically plated for

longer than 24 hours to achieve the required thickness of chromium.

The major discharges of hazardous waste from typical metal plating facilities are rinsewater contaminated by drag-out from various cleaning and plating baths; cleanup of spills; disposal of acid and alkaline cleaners; and occasional plating bath dumps.

The Naval Civil Engineering Laboratory (NCEL), Port Hueneme, California, implemented several process modifications at Pensacola NARF to reduce wastes generated by the hard chrome plating shop. An existing countercurrent rinse tank was retrofitted with a recirculating spray rinse system to significantly reduce rinsewater requirements.

A pump recirculates rinsewater through eight high-velocity spray nozzles located around the perimeter of the rinse tank. The pump is activated by a foot pedal as parts are lowered into the empty tank. Clean rinsewater is available via a hand-held sprayer. After repeated use, a portion of the rinsewater is pumped through a cloth filter into the plating tank and added to the plating bath to replace water lost through evaporation. Plating baths are operated at elevated temperatures to increase the rates of both evaporation and plating.

These modifications reduced the use of fresh water from 350,000 gallons per month for countercurrent rinsing to about 1,200 gallons per month for spray rinsing. Since this amount was less than the evaporation rate, all of the spray rinse was returned to the plating bath, resulting in a "zero discharge" condition. A total savings of approximately \$25,000 per year per bath was projected, principally due to reduced industrial wastewater treatment costs.

Without drag-out to aid in removal of contaminants from the bath, a cleanup process was required to reduce the need for plating bath dumps. An electrolytic bath purification system was installed to continuously remove cations from the chromium plating solution. The system uses cathodes contained within membrane modules to selectively precipitate cation impurities from the plating solution and anodes to oxidize trivalent chromium to hexavalent chromium. Hexavalent chromium ions remain on the anode side of the membrane and are returned to the plating bath.

The purification system did not effectively remove contamination from the chromium plating bath during a trial run. The system experienced a failure of the membrane modules that was caused by a change of material by a supplier. Replacement of the membrane modules is expected to rectify

the problem, but further testing is required before this technology can be recommended at other DOD facilities.

Although the prime reason for NCEL's involvement was reduction of hazardous waste, process changes that resulted in production benefits were included in the package to encourage the adoption of the new spray rinse system. These benefits included faster, more efficient plating and fewer rejections.

That these plating modifications have succeeded is due in large part to the dedication of Mr. Charles Carpenter of NCEL, who originated the new system, diligently supervised its implementation, and remained available for ongoing consultation. In addition, there has been strong support for the modifications from the engineering staff and management at Pensacola NARF.

### 2.3 Centralized Vehicle Washracks and Scheduled Maintenance Facilities at Fort Lewis

Prior to servicing, tactical vehicles and equipment used at Army bases are typically washed and cleaned at a common washrack located at individual motor pools. Each base has 2 to 45 washing locations with a total of 30 to 80 washracks. Exterior washing involves removing road dirt and sediment from tracked and wheeled vehicles. Detergents and solvents are sometimes used to assist in exterior cleaning.

Scheduled maintenance of tracked vehicles is usually preceded by removing the engine from the vehicle and cleaning both the engine and its compartment. Cleaning prior to servicing often removes large quantities of petroleum, dirt, and vegetation. Solvents are regularly used to assist in the cleaning operation.

Vehicle washing produces a large volume of wastewater, which is principally contaminated with soils and minimal concentrations of oils and organic material. Maintenance produces low flows of wastewater that is heavily contaminated with oils, greases, solvents, and other organic contaminants.

Conventional Army practice has been to perform both washing and maintenance on open wash stands, with the resulting large flow of contaminated wastewater discharging to the base stormwater system. Many facilities were having difficulty meeting permit requirements. In addition to a lack of wastewater treatment, other deficiencies of the combined washing facilities include inadequate water pressure, ineffective solvent and oil collection facilities, and undependable steam cleaners.

Planning for process modifications to reduce water and solvent use began in 1974 at the Corps of Engineers Construction Engineering Research Laboratory (CERL) in Champaign, Illinois. Joe Matherly of CERL developed the concept of segregating external vehicle cleaning from maintenance servicing so that the resulting two waste streams could be treated separately.

At Fort Lewis, in Washington, Dave Hanke, Chief of the Sanitation Branch, implemented the program to segregate cleaning and maintenance facilities in response to notices of violations caused by the discharge of polluted storm-water from the facility. Fort Lewis has installed three central vehicle wash facilities, each consisting of a series of individual wash stations. At each station, the users have access to two hoses suspended from booms. Each hose supplies 30 gallons per minute of 90 psi water. With the lower water pressure in the old system, cleaning a vehicle required approximately 2 hours. With the new high-pressure system, a tracked vehicle can be washed in approximately 20 to 30 minutes, and a wheeled vehicle can be washed in 15 to 20 minutes.

Waste washwater is treated with a simple gravity (API) oil/water separator and intermittent sand filters and is reused. At one of the vehicle wash facilities, water is not recycled but is discharged to the sanitary sewer instead.

At Fort Lewis, facilities were designed to provide a covered location for scheduled maintenance to exclude rainwater and limit the production of solvent- and oil-laden wastewater. High-pressure, hot water cleaners are used to remove oil and grease from engine compartments, eliminating the need for solvents and detergents, which promote emulsification of oil and complicate treatment. The resulting low volume of oil-laden wastewater is then treated in gravity oil/water separators and discharged to the sanitary sewer system.

The combination of reduced solvent use, separation of exterior cleaning from vehicle maintenance, and installation of oil/water separators has led to a 90 to 95 percent reduction in the contaminants being discharged through the storm sewers to surface water at Fort Lewis.

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### 3. WORKSHOP OVERVIEW

#### 3.1 Purpose

The overall purpose of the waste reduction project was to encourage the spread of successful industrial process modifications to other DOD facilities to effect a reduction in hazardous wastes. Two-day workshops, presented at the sites of the three Projects of Excellence, were the means by which this transfer of technology was to be accomplished.

The three Projects of Excellence are:

1. Plastic Media Paint Stripping at Hill Air Force Base, Ogden, Utah
2. Innovative Hard Chrome Plating at Pensacola Naval Air Rework Facility, Pensacola, Florida
3. Centralized Vehicle Washracks and Scheduled Maintenance Facilities at Fort Lewis, Tacoma, Washington

Workshops were held on the following dates:

1. Hill AFB -- August 13-14, 1985
2. Pensacola NARF -- September 11-12, 1985
3. Fort Lewis -- October 2-3, 1985

The success of the workshops was demonstrated by:

1. The number of participants and the range of their responsibilities within their organizations
2. The type and quantity of information that was transferred
3. The questions and discussions that were generated
4. The verbal and written responses from the participants

The ultimate success of the workshops should be judged by the extent to which the participants incorporate workshop concepts and implement desirable process modifications in their future work.

### 3.2 Workshop Planning

The overall project was geared toward preparation of the workshops. Measures taken to increase the probability of the success of the workshops included the following.

- o The DOD Environmental Leadership Project selected successful, highly desirable process modifications with widespread applications. DOD designated these process modifications as Projects of Excellence, which helped to emphasize their importance and attract workshop participants.
- o One Project of Excellence was identified for each of the armed services, and participation in each workshop was limited to members of the service involved. This helped to focus each workshop on immediate applications of the process modifications at similar facilities and precluded potential interservice coordination problems. A proposed Phase 4 of the project will identify additional applications of the process modifications in all of the armed services and will culminate in tri-service workshops for each of the Projects of Excellence.
- o The Projects of Excellence contained elements that appeal to command, operations, maintenance, quality control, and logistics personnel, in addition to those with primarily environmental responsibilities. The three projects have great potential for increasing productivity, improving quality control, and enhancing working conditions, as well as reducing waste generation. These additional benefits were emphasized to create additional interest in the process modifications and to speed their adoption.
- o A cross-section of civilian and military personnel was invited to participate in each workshop in order to promote intraservice communication and cooperation with regard to the process modifications. Each workshop included appropriate personnel from facilities engineering, environmental engineering, operations, maintenance, quality control, logistics, master planning, etc., and from various levels in the relevant service's command and staff structure.
- o The workshops were intended to give first-hand knowledge of the new technologies to both decision makers and workers. Participants included managers, engineers, scientists, and process operators.
- o In order to promote rapid technology transfer, the workshops were given at the earliest possible dates

when the potential benefits of the project modifications were readily apparent but before the demonstration phase could be completed. The workshops were structured to give a balanced view by comparing the old technologies with the new from several viewpoints, by pointing out the limitations of existing knowledge, and by emphasizing the factors that could influence the success or failure of similar modifications in the future.

- o The workshops were designed to be interesting and informative in order to make strong, favorable, and lasting impressions on the participants by appealing to their senses as well as to their professional and intellectual interests. Project Champions were enlisted as speakers and demonstrators because of their knowledge and enthusiasm. Audiovisual aids, especially slides and videotapes, were used to expand the scope and the impact of the presentations. Onsite tours and hands-on demonstrations were used to further heighten interest, to answer questions, and to show concrete results of the process modifications. Detailed manuals containing useful information were given to the participants to be read and kept for future reference.
- o The Project Champions who developed the projects were invaluable in organizing and presenting the workshops. They are:

Mr. Bob Roberts, Hill AFB  
Mr. Charles Carpenter, Naval Civil Engineering  
Laboratory  
Mr. David Hanke, Fort Lewis

Mr. Ralph Powell at Hill AFB and Mr. Frank Stuart at Pensacola NARF gave considerable assistance in arranging the workshops at their facilities. Mr. Joseph Matherly of the Construction Engineering Research Laboratory, another Project Champion for the Centralized Washracks and Scheduled Maintenance Facilities project, also participated in the workshop at Fort Lewis.

### 3.3 Workshop Structure

The agenda for each workshop is contained in the front of a detailed manual that was prepared for the participants. The final versions of the manuals for each workshop are provided as appendices to this report.

The agenda was generally structured as follows:

- o Day 1, Morning - Conference room presentations

Welcome by installation representative  
Introductions by participants  
Description of DOD hazardous waste concerns by  
Dr. Richard Boubel, DELP  
Description of the overall project by Dr. Thomas  
Higgins, CH2M HILL  
Development and description of the Project of  
Excellence by the Project Champion  
Videotape or film of the project  
Questions and discussion

- o Day 1, Afternoon - Tours and demonstrations of facilities
- o Day 2, Morning - Conference room presentations  
Planning and programming considerations by the Project Champion  
Productivity benefits (presenters varied)  
Occupational and environmental benefits (presenters varied)  
Summary by Dr. Brian Higgins, PEER Consultants  
Project funding and future directions by Dr. Richard Boubel, DELP
- o Day 2, Afternoon - Tours and hands-on demonstrations

This workshop structure allowed the Project of Excellence to be put into perspective with regard to:

1. The increasing problems and costs associated with hazardous wastes
2. Alternative technologies to reduce or eliminate hazardous waste generation
3. Reasons for the success or failure of process modifications
4. Potential benefits and remaining concerns associated with the Project of Excellence

### 3.4 Invitations

Invitations to the workshop were sent through the chain of command from the Director of Environmental Policy in the Office of the Assistant Secretary of Defense. Invitations were also sent by CH2M HILL to selected individuals and installations. Material from the workshop manuals, including the contents, the agenda, a list of participants, a description of participating organizations, and workshop

location maps, was attached to the invitations to encourage people to attend.

The invitations recommended that a team of appropriate people from each installation attend the workshop. No limits were placed on the number of participants, but each workshop was limited to members of the host armed service. Manufacturers and sales representatives were not invited to participate except during the tours and demonstrations.

The initial workshops were not publicized in the news media.

### 3.5 Logistics

Approximately 2 months before each workshop, all workshop requirements were listed and assigned to the appropriate people as shown in Table 3-1.

Conference rooms that were large enough to accommodate at least 30 participants comfortably as close as possible to the locations of the tours and demonstrations were selected. Tables and chairs were arranged in rectangular or oval conference style, rather than auditorium style, to promote interaction and discussion among the participants.

The workshops were scheduled to begin and end at the same time each day to avoid confusion. The starting time was late enough to avoid the local rush hour and to allow travelers sufficient time to find the conference room.

Sit-down presentations were made in the mornings when the participants were presumably well rested and alert. Coffee and doughnuts were provided, and rest breaks were offered between speakers (approximately every hour). Information was provided on local restaurants for lunch and dinner.

Table 3-1  
WORKSHOP REQUIREMENTS AND RESPONSIBILITIES

	Requirements	Responsible Person(s)
1.	Workshop organization, coordination of speakers, and moderator	B. Higgins, PEER
2.	Invitation and coordination of other participants	D. Boubel, DELP, and T. Higgins, CH2M HILL
3.	Coordination with protocol, visitor control, public affairs, and news media	D. Boubel
4.	Bound workshop manual (40 copies)	B. Higgins and T. Higgins
5.	Other handouts	Appropriate speakers
6.	Conference room suitable for 30 people with tables and chairs arranged in rectangular or oval fashion	Project Champion
7.	Coordination of welcome by installation representative	Project Champion
8.	Audiovisual aids in conference room: a. Carousel slide projector with remote control, extra lamp, and extension cord b. U-Matic (3/4") videotape machine and TV monitor c. 16-mm movie projector d. Transparency projector e. Screen (at least 50" x 50") f. Blackboard/chalk/eraser or flip chart paper and colored felt-tip pens g. Tablet and pencil for each participant	Project Champion
9.	Videocassettes and film	B. Higgins and Project Champion
10.	Slides, exhibits, boards, samples, photos, etc.	Appropriate speakers
11.	Guides and availability and condition of facilities for tours and demonstrations	Project Champion and shop foremen

Table 3-1  
WORKSHOP REQUIREMENTS AND RESPONSIBILITIES  
(continued)

<u>Requirements</u>		<u>Responsible Person(s)</u>
12.	Travel, lodging, and subsistence	Participants
13.	Local transportation	
	Private vehicles	Participants
	Bus	Project Champion

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The moderator introduced the speakers, made administrative announcements, answered questions, and distributed manuals as appropriate.

A videotape of one of the other Projects of Excellence was usually shown at the beginning of each afternoon while the participants reassembled. Then the Project Champion and the appropriate shop foremen, operators, and contractors gave guided tours of all of the facilities related to the Project of Excellence and answered questions. Live, hands-on demonstrations were used as much as possible. Participants generally spent as much time as they wanted in the areas that interested them.

The cooperation, knowledge, and enthusiasm of participating personnel at the workshop sites was excellent and contributed immeasurably to the success of the workshops. Letters of appreciation were sent to the principal speakers through their commanding officers.

### 3.6 Workshop Manuals

A bound manual was prepared for each of the three workshops. The final versions of the three manuals are attached to this report. Table 3-2 contains the table of contents for the manuals.

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Table 3-2  
GENERIC TABLE OF CONTENTS FOR THE  
WORKSHOP MANUALS

Agenda	
Workshop Response Survey	
Participants	
Participating Organizations	
Workshop Location Maps	
1.0 Introduction	
2.0 Project Description	
3.0 Alternative Process Modifications	
4.0 Project Requirements	
5.0 Production Benefits	
6.0 Occupational and Environmental Benefits	
7.0 Demonstrations and Tours	
Bibliography	
Appendices	
1.0 Policy Documents Concerning DOD Hazardous Waste	
2.0 Selected References	
3.0 Manufacturers' Literature/Equipment Specifications	

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The front section of the manual was used to organize each workshop. The introduction emphasized the importance of reducing DOD hazardous waste generation and summarized the first two phases of the project. The remaining sections provided extensive information from various perspectives for each Project of Excellence. The bibliography listed numerous documents pertaining to the project. Many of the documents were incorporated in the manual to be read and kept for future reference by the participants. These documents are generally hard to obtain.

The covers of the manuals were designed to emphasize the importance of each Project of Excellence. DOD seals and colors were used to promote armed services recognition for each project.

The following sections list the participants and describe the results of each workshop.

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#### 4. WORKSHOP ON PLASTIC MEDIA PAINT STRIPPING, HILL AFB

##### 4.1 Workshop Review

The workshop on plastic media paint stripping was held at the Ogden Air Logistics Center (ALC) of Hill AFB in Utah on August 13-14, 1985. Approximately 32 people participated in the workshop, with about 20 present for most of the sessions. A list of the participants, grouped by the organizations they represent, is provided as Table 4-1. Addresses and telephone numbers for these people are provided in the participants section of the workshop manual. The manual is included in a separate volume as Appendix A to this report.

Mr. Bob Roberts served as principal speaker and demonstrator for the workshop. Mr. Roberts, the Project Champion, was primarily responsible for developing plastic media paint stripping while working at Hill AFB and for publicizing its benefits to the rest of the world. Although he retired from his civilian position at Hill AFB on August 3, 1985, he participated in the workshop as a subconsultant to CH2M HILL. Mr. Ralph Powell, as Ogden ALC Facilities and Equipment Section Chief, made most of the local arrangements for the workshop and arranged for facilities and personnel to be available for demonstrations.

Participants in the workshop represented key organizations that could spread the use of plastic media stripping to the rest of the Air Force. Participants from the Air Logistics Headquarters, three of the five Air Logistics Centers (Ogden, Oklahoma City, and Warner-Robins), the Air Force Storage and Disposition Center at Davis-Monthan AFB, and the Air Force Museum learned first-hand the potential benefits of plastic media paint stripping and how to implement this process.

A popular part of the workshop was the hands-on demonstration of the blasting and plastic bead recovery equipment, ranging from small, inexpensive (under \$20,000) portable equipment to the large, fixed, five-position blast booth capable of stripping a complete F-4 fighter in one shift. Participants tested their skills by paint stripping soda cans, whose thin, soft aluminum construction is a challenge to even a skilled operator. A new portable blasting machine was demonstrated on a carbon graphite composite component of an F-16 fighter. This machine combined a blast nozzle with media recovery suction in a single head, eliminating the requirements for an enclosed booth for media recovery and dust control.

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Table 4-1  
WORKSHOP PARTICIPANTS - HILL AFB

DOD Environmental Leadership Office  
Richard Boubel, Project Officer

CH2M HILL  
Thomas Higgins, Project Manager

PEER Consultants  
Brian Higgins, Workshop Manager

Consultant  
Bob Roberts, Project Champion

Ogden Air Logistics Center, Hill AFB  
BG Harold Campbell, Vice Commander  
Gene Mortensen, Deputy Director of Maintenance  
Ralph Powell, Section Chief  
Tom Byers, Engineer  
Galen Seck, Technician  
Leon Jaeger, F-4 Liaison

Hill AFB  
LTC M.G. Moody, Staff Bioenvironmental Engineer  
Samuel Vigil, Industrial Hygienist  
Willard Ferrell, Industrial Hygienist  
Allan Dalpias, Environmental Coordinator  
Allen Budge, Corrosion Control Chemist  
Dave Chase, Metallurgist

Air Logistics Center Headquarters, Wright-Patterson AFB  
Ken Vincent, PRAM Program Manager  
Wally Quaider, Environmental Engineer

Air Force Museum, Wright-Patterson AFB  
Nelson Hall, Chief of Restoration Division

Warner-Robins Air Logistics Center, Robins AFB  
Mike Wayne, Industrial Engineer  
Ed Williams, General Foreman of Painting

Robins AFB  
Dillon Logue, Bioenvironmental Engineering

Oklahoma City Air Logistics Center, Tinker AFB  
2LT Mikael Spanberg  
Charles Campbell, Chief of Aircraft Services Section  
Bill Cain, Chemical Engineer  
Robert Dillon, Quality Control

Table 4-1  
WORKSHOP PARTICIPANTS - HILL AFB  
(continued)

Air Force Storage and Disposition Center, Davis-Monthan AFB  
Vicki Singleton, Materials Engineer  
Michael Coiro, Chief of Planning Section

Contractors

Oscar Royce, Royce Mechanical Systems  
Don Petersen, Royce Mechanical Systems  
Fred Steinkamp, CompAir Kellogg, Inc.  
Daniel Skwozynski, CompAir Kellogg, Inc.

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The full-scale blast booth was not in full operation, due to a local shortage of the fine plastic media selected for production use in the facility. Instead, one of the blast machines was charged with a coarser media, and this machine was used to demonstrate the booth by stripping an F-4 wing fold. An advantage of not having the booth in full operation was that the booth and operations personnel were available to demonstrate the system without the production pressures of stripping an aircraft.

Issues raised during the workshop included personnel health and safety concerns associated with working in a metal-contaminated dusty environment. Mr. Roberts contended that the explosion hazard was minimal in the blast booth because the high dust concentrations and the ignition energy required to cause the dust to explode were absent. He also noted that hoods and fresh air are provided to operators and that safety interlocks are used to prevent unprotected individuals from entering the booth during operation.

One adverse impact of plastic media paint stripping on materials was that the process tended to close small cracks, hiding them from detection by dye penetration methods. It was noted, however, that another available method of crack detection was not affected by this crack closing.

The consensus of the participants was that, though there are concerns which must be addressed, the method is much less hazardous to the workers and less harmful to the aircraft than the current wet paint stripping methods, and potential problems with plastic media paint stripping are solvable.

The technology transfer goal of the workshop appears to have been successfully met. Following the workshop, two blast machines were purchased by workshop participants for use in reconditioning planes at the Storage and Disposition Center at Davis-Monthan AFB.

#### 4.2 Responses of Participants

At the end of the workshop, participants were encouraged to fill out a survey form so that the value of workshop could be better determined and so participants' needs and suggestions could be incorporated into future workshops. The one-page survey forms appeared immediately after the agenda in the manuals. Only six completed survey forms were received after the workshop at Hill AFB. More emphasis was placed on filling out and completing the forms at the two subsequent workshops.

Comments received on the response survey forms for this workshop are summarized below. Numbers in parentheses

indicate that more than one participant made similar comments.

1. Why did you come to the workshop - what did you hope to learn?

What the process is and how it works (3)

Sources of possible funding (2)

How I can apply the process to my facility

How the process is being pitched to the outside world

To gain information necessary for preventing occupational health problems in future use of such facilities

2. What parts of the program were of most interest to you?

The demonstrations (2)

The speakers were excellent

Funding issues

Plant operation and start-up

I was somewhat surprised to see the efficiency of the process

Health and safety (3)

Pollution control (2)

3. What additional topics should have been covered?

More of the problems that could be encountered

All subjects were covered thoroughly. I enjoyed it.

Funding

Applicability to other coatings and substrates

Compliance with OSHA regulations

4. What problems do you foresee in developing a plastic media paint stripping facility at your installation?

TAC (Tactical Air Command)

Funding for a facility to remove paint from C-135,  
B-52, E-3A, A-7, and B-1 aircraft

Sizing the facility

Money, funds (3)

Make system fail-safe so that explosion hazard is  
totally eliminated

Make system safe so that workers can't experience  
occupational illnesses. This is not totally worked out  
at Hill yet

More information exchange should have occurred with  
fire, health, and safety personnel during prototype  
development at Hill AFB (2)

Motivation

Regulatory compliance

5. Are there other process modifications with the  
potential to improve productivity and/or reduce waste  
generation that you hope to see implemented?

Paint solvent recovery still

Modify paint formulation to minimize the use of  
hazardous materials

6. What methods of information/technology transfer would  
have the greatest chance for success in helping to  
spread new technologies?

More workshops, seminars, demonstrations (4)

Mailouts, publications (2)

This is hard to do at the ALCs because of their size

In the advertising world, it is said, "To sell 'em,  
tell 'em"!

Air Force Now movies

Tell whole USAF what is being developed

Advertise sources of information on new technologies

Question 7 was not included for this workshop.

WDR127/036

5. WORKSHOP ON INNOVATIVE HARD CHROME PLATING,  
PENSACOLA NARF

5.1 Workshop Review

The workshop on innovative hard chrome plating was held at the Naval Air Rework Facility at the Pensacola Naval Air Station in Florida on September 11-12, 1985. Approximately 36 people participated in the workshop, with about 30 present for most of the sessions. A list of the participants, grouped by the organizations they represent, is provided in Table 5-1. Addresses and telephone numbers for these people are provided in the participants section of the workshop manual. The manual is included in a separate volume as Appendix B to this report.

Mr. Charles Carpenter, the Project Champion from the Naval Civil Engineering Laboratory, was primarily responsible for implementing the innovative hard chrome plating process at Pensacola NARF, Louisville Naval Ordnance Center, Puget Sound Naval Shipyard, and Pearl Harbor Naval Shipyard. He served as the principal speaker and demonstrator during the workshop. Mr. Greg Piner, who implemented the process at Cherry Point NARF, gave a dynamic and well-received presentation on how to tell if you have chrome plating problems and things to remember when converting to the innovative process. Mr. Frank Stuart, Pensacola NARF Facilities Engineer, made most of the local arrangements for the workshop.

The workshop was a success judging by the interest shown in the hard chrome plating Project of Excellence and in other process modifications, especially plastic media paint stripping, solvent recovery, and uses of steam condensate.

The workshop included tours of all the facilities related to hard chrome plating modifications, including the foundry, the masking and racking shop, the plating shop, the laboratory, the machine shop, and the wastewater treatment plant. Because of ventilation problems and repairs to the spray rinse system, the modified chrome plating tanks were not in operation. However, slides and a 16-mm film were used to illustrate all aspects of the process modification.

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Table 5-1  
WORKSHOP PARTICIPANTS - PENSACOLA NARF

DOD Environmental Leadership Office  
Richard Boubel, Project Officer

CH2M HILL  
Thomas Higgins, Project Manager

PEER Consultants  
Brian Higgins, Workshop Manager

Naval Civil Engineering Laboratory, Port Hueneme  
Charles Carpenter, Project Champion

Pensacola NARF  
Capt. Robert Duff, Commanding Officer  
Frank Stuart, Facilities Engineer  
DeWayne Ray, Environmental Engineer  
Gary Whitfield, Chemist  
James Inmon, Physical Science Technician  
David Marriott, Electroplater  
Steve Sapp, Electroplater  
Tom Swindle, Machinist Foreman  
Robert Alexander, Foundry and Welding Shop Foreman  
Kenny Sanders, Materials Testing Laboratory

Pensacola NAS  
Edward Pike, Environmental Engineer  
Elbert Ervin, Foreman, Wastewater Treatment Facility

Naval Sea Systems Command  
James Franson

Naval Facilities Command  
Chris Matthews  
Victor Crawford

Naval Facilities Command, Southern Division  
Hugh Kennedy

Cherry Point NARF  
Greg Piner, Materials Process Chemist

Philadelphia Naval Shipyard  
Robert Harley  
Jim Franchetti  
Gerald Greth  
Mike Danko

Table 5-1  
WORKSHOP PARTICIPANTS - PENSACOLA NARF  
(continued)

Charleston Naval Shipyard

Herbert Herrmann, General Foreman of Machine Shop  
Wesley Chubb, Electroplater Training Leader

Alameda NAS

Larry Lai  
Eugene Gideon, Chemical Foreman

North Island NARF

James Leland, Director of Technology  
John Parker  
Bernard Benford

Jacksonville NAS

Robert Vines  
Neva Schesventer

Long Beach Naval Shipyard

John Held  
Hiawatha Mitchell

Mare Island Naval Shipyard

Robert Brooks

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## 5.2 Responses of Participants

Completed workshop response survey forms were received from 19 participants. Their comments are summarized below.

1. Why did you come to the workshop - What did you hope to learn?

Hard chrome, learning about this system (12)

How to get hard chrome plating on line

Better understanding of operational problems

NAVFAC is pushing the system

To hear comments from the field

Necessary to increase production, reduce rejects, etc.  
(5)

How to reduce hazardous waste (4)

How to get environmental funds for process improvements

Cost reduction (3)

2. What parts of the program were of most interest to you?

Chrome plating chemistry considerations

Experience at other Navy installations

Speeches by Charles Carpenter

Presentations by Greg Piner on the approach taken to get the project on line at Cherry Point

Interaction of personnel as to their ability to accept the proposed process

Tours and demonstrations (8)

Details on how the process works (2)

Masking and racking shop

Manufacture of conforming anodes (2)

Plating rates

Waste reduction

All (3)

Film, talk by A/E and NCEL

Solvents

Dry media paint stripping (3)

CatNapper installation

Tours good for nonfield people

Spray rinse total recovery idea

Grid anode concept

3. What additional topics should have been covered?

Safety

Tank ventilation (2)

Recovery techniques

Government specifications governing the process

Metering requirements

None (2)

Expected more innovation on conforming anodes

Funding

Successful and unsuccessful case studies and scenarios

Triple-rinse tanks

Cost of mat manufacturing, tank conversion

Comparison of metallurgical samples of chrome from old and new systems

4. What problems do you foresee in developing the capability for innovative hard chrome plating at your installation?

Training (2)

Support

Approval and complete follow-through by supervisors

Convincing management to make the changeover (3)

Getting the shops to accept the new process

Funding (4)

Changing employee habits (4)

Inertia

Extremely large and heavy parts

Special racks are used to plate internal diameters of very large parts without external masking and with the tank anodes disconnected

Round tanks

Method must be thoroughly tested (metallurgically) before lab will allow it

Procuring CatNapper-10; require specs to procure or recommend bulk purchase for all shipyards (2)

General problems with masking and racking assemblies

Some limitations on applications

5. Are there other process modifications with the potential to improve productivity and/or reduce waste generation that you hope to see implemented?

How to reduce the use of lead

Improve the CatNapper-10

More dependable water level and purity controls on tanks

Fumetrol is better than ping pong balls for mist control

Faster turnaround time with a minimum of waste

Use of CO<sub>2</sub> for paint removal

6. What methods of information/technology transfer do you think would have the greatest chance for success in helping to spread process improvements and new technologies?

More workshops, conferences (7)

Get more production people involved

Videotapes, film (3)

Personal telephone contacts

Inform not only shop/division heads but also first-line supervisors and instructors

Have DOD mandate that all agencies operate the same way

This was a very good presentation for high-volume small parts, but many parts for ships and subs would not fit in the tanks we saw

Get both operators and top management to these meetings

Availability of reports

Technical advisories to production engineering functions of the NARFs

Criteria are on the right track; elegantly simple, reliable, easy to operate/maintain. Add funding and contracted engineering assistance

Have centrally funded organization for education and technical assistance without becoming doctrinaire

Get people doing the work to participate in the programs

More training and technical data

Real waste reduction or elimination

7. Other comments?

I learned quite a bit and my agency will benefit.

I am interested in other projects.

Philadelphia NSY would like a VHS copy of the film dealing with chrome plating.

I am also interested in plastic media stripping and vehicle maintenance.

All of the innovations are good ideas, especially when they improve productivity and decrease pollution.

Someone has to make sure that these benefits are designed into new projects. Selection of A/Es for the

design is critical. NAVFAC geographical EFDs need to do a better job of design review and to pay more attention to the end user of the facility.

WDR127/037

6. WORKSHOP ON CENTRALIZED VEHICLE WASHRACKS AND  
SCHEDULED MAINTENANCE FACILITIES, FORT LEWIS

6.1 Workshop Review

The workshop on centralized vehicle washracks and scheduled maintenance facilities was held at Fort Lewis in Washington on October 2-3, 1985. Approximately 40 people participated in the workshop, with about 31 present for most of the sessions. A list of the participants, grouped by the organizations they represent, is provided in Table 6-1. Addresses and telephone numbers for these people are provided in the participants section of the workshop manual. The manual is included in a separate volume as Appendix C to this report.

Mr. Dave Hanke, the Project Champion and Chief of the Sanitation Section at Fort Lewis, served as the principal speaker and tour guide during the workshop. He also made most of the local arrangements for the workshop. Mr. Joseph Matherly, the Project Champion at the Army Construction Engineering Research Laboratory, spoke concerning planning and programming considerations. Mr. Walter Medding and Mr. Tom Wash from the Corps of Engineers Headquarters also spoke concerning the importance of the Project.

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Table 6-1  
WORKSHOP PARTICIPANTS - FORT LEWIS

DOD Environmental Leadership Office  
Richard Boubel, Project Officer

CH2M HILL  
Thomas Higgins, Project Manager

PEER Consultants  
Brian Higgins, Workshop Manager

Fort Lewis  
David Hanke, Project Co-Champion  
COL Jack McNall, Director of Engineering and Housing  
Richard Pitzen, Foreman, Fort Lewis Wastewater Treatment Plant  
Tom Headley, Curator, Fort Lewis Military Museum

U.S. Army Corps of Engineers, Construction Engineering Research  
Laboratory  
Joseph Matherly, Project Co-Champion

U.S. Army Corps of Engineers Headquarters  
Walter Medding, Environmental Engineer  
Tom Wash, Environmental Engineer

U.S. Army Headquarters, Office of the Deputy Chief of Staff for  
Logistics  
Leon Davis, Logistics Management Specialist

U.S. Army Forces Command Headquarters  
MAJ Thomas Butz, Staff Engineer  
Guy Dunnavant, Chief of Design Review  
Ron Nichols, Sanitary Engineer

U.S. Army National Guard Bureau  
Howard Ritchey

U.S. Army Facilities Engineering Support Agency  
Robert Ross, Chief Sanitary Engineer

U.S. Army Engineer District, Sacramento  
Frank Baser, Environmental Engineer

Anniston Army Depot  
Ron Grant, Environmental Coordinator

Tooele Army Depot  
Rudy Verzuh, Production Engineering

Table 6-1  
WORKSHOP PARTICIPANTS - FORT LEWIS  
(continued)

Fort Bliss  
Jim Kemp, Chief of Master Planning

Fort Bragg  
Bruce Anderson, Supervisory General Engineer  
Judith Hudson, Civil Engineer  
Steve Mackmull, Environmental Engineer

Fort Campbell  
Robert Wasitas, Master Planning  
DeWayne Smith, Energy, Environment and Natural Resources

Fort Carson  
COL Henry Brown, Director of Engineering and Housing  
Nelson Kelm, Environmental Office

Fort Leonard Wood  
Richard Baker

Fort Lewis  
Steve Glover, Chief of Master Planning  
Jennifer McGrath, Master Planning  
James Daniels, Master Planning  
Carolyn Read, Master Planning

Washington Army National Guard, Camp Murray  
COL Harry Mayfield, Director of Engineering  
MAJ John McDonagh, Organizational Maintenance Officer

Fort Riley  
Russell Conard, Industrial Operations

Fort Sill  
Steve Anschutz, Chief, Environmental Division  
Bill Lewis, Chief, Public Works Division  
Serge Saltiel, Master Planning  
Lyle R. Smith, III Corps

Contractor  
Richard Lundin, Allstate Services Co.

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The workshop was a success judging by the turnout and the questions and discussions that were generated. Army Reserve and National Guard requirements were also addressed. Several participants met during lunch on the second day to resolve problems with the washracks at Fort Carson. At the suggestion of several participants, the following sites were added to the afternoon tours: site preparation for the new \$360 million Madigan Army Hospital; Fort Lewis family housing; and the 700-foot-long, roller-compacted concrete test strip road near the North Fort washracks. In addition, Mr. Tom Headly, Curator of the Fort Lewis Military Museum, in which the workshop was held, gave a brief tour of the museum and described how it is being upgraded to become the Military Museum of the Pacific Northwest.

Since the 2nd Battalion, 77th Armored Division was at Yakima Firing Center for training exercises during the workshop, many tracked vehicles were not at Fort Lewis for live washing and maintenance demonstrations. In addition, Fort Lewis had extremely dry weather before and during the workshop, so the vehicles that were washed during the tours were not heavily soiled.

Slides, CERL's videotape, and onsite demonstrations compensated for relatively light use of the vehicle washing and maintenance facilities during the workshop. Information on other Projects of Excellence and on DELP in general was provided through a slide show and videotapes.

At both the washracks and the scheduled maintenance facilities, significant maintenance problems existed which, if not corrected, could negate the positive effects of this Project of Excellence. Problems noted included high attrition of the high-pressure hot water washers and full waste oil storage tanks at the scheduled maintenance facilities and missing hoses, missing nozzles, and broken valves at the North Fort washracks.

The facilities were installed under the direction of Mr. Dave Hanke, Chief of the Sanitation Branch, to correct some severe pollution problems. Due to other responsibilities, Mr. Hanke does not have the time (or the authority) to supervise operation and maintenance of the washracks and maintenance facilities.

Responsibility for ongoing operation and maintenance of the facilities is confusingly split between the central motor pool (which is being put under civilian contract), the individual motor pools, and civilian contractors. To compound the problem, the previous contractor for the North Fort washracks was replaced, and the new contractor would not make repairs that he felt were the responsibility of the

previous contractor. Improved management of these facilities is needed in order to meet their potential.

## 6.2 Responses of Participants

Completed workshop response survey forms were received from 23 participants. Their comments are summarized below.

### 1. Why did you come to the workshop - what did you hope to learn?

To benefit from problems and solutions at other posts on design and O&M (7)

To learn first-hand about the latest technologies and the facilities (10)

How to improve industrial operations, particularly from the standpoint of minimizing wastewater

To learn about DELP and DELP projects

To ensure that CVWF technology continues to stay on track

To renew old contacts and make new ones on new technology

What we can do within DA ODCSLOG to propagate this type of technology

Ways to do a better job for FORSCOM in the areas of CVWF and SMF

Information on installation programming and design review of CVWF and SMF

To represent Washington Army National Guard, which has permanent installations at Fort Lewis and Yakima Firing Center

Responsibilities include administrative and logistic procedures for handling hazardous waste materials

To gather ideas that may be used to solve environmental problems at Army installations

Review savings

To find ways to replace our present steam cleaning/soap/solvent operation and methods to treat the effluent

2. Which parts of the program were of most interest to you?

Design or operation and maintenance problems

Entire program was useful, very well done (6)

Exchange of information between participants (2)

The wheeled and tracked vehicle washracks

The facilities were well maintained

The speakers

The tours (5)

All information concerning motor pools

CVFW and/or SMP funding (2)

Plastic media paint removal (2)

Scheduled maintenance platforms/facilities

Recycle of washrack wastewater

Talks on design considerations (2)

Lessons learned (2)

Planning and programming considerations (2)

Hazardous waste "birth control" concept

Description of water treatment process

3. What additional topics should have been covered?

USAR Center washracks

How to handle existing wash and maintenance facilities

Operating official from Fort Polk

Troop unit "user" to tell his side of the story

Demonstration of cleaning a tank that is very muddy

Funding methods, programming, and future funding levels (2)

Cost reduction and trade-offs

Maybe a portion on relationships of players and how to get things done

More detail on how a post can obtain facilities

More details on mistakes made by other installations and avoidance techniques

Assuring a "macroview" of the total problems and solutions

LUST (Leaking Underground Storage Tanks)

How to handle battery acids; design and safety of battery rooms

More discussion on facility maintenance and operation problems

Scoping

Development of new, safe cleaning solvents

Designing to be troop proof

More specific discussion of water treatment process

4. What problems do you foresee in developing centralized vehicle washracks and centralized maintenance facilities at your installation?

Proper identification of the problems, sizing of the problems, and getting the paperwork through the mill  
(4)

No major ones (2)

Special design considerations that address special local needs for washracks (2)

Determining whether or not to retrofit or build new maintenance facilities

Funding, obtaining high enough priority (5)

Developing simple, user friendly, troop proof facilities that perform satisfactorily (2)

Waste minimization

Trying to get support district to follow instructions

Operation and maintenance to keep the washracks serviceable

Continued use of old facilities even though the new capability exists at the installations

Depot requirements are different than those discussed at Fort Lewis and Fort Polk

Convincing maintenance personnel that hot water sans solvents will provide adequate cleaning

Scheduled maintenance pads in existing facilities do not seem to get support from the troops

Attitude of soldiers; command emphasis; inclement weather; major exercises; Navy and Marine training; National Guard and Reserve components not familiar with Fort Bragg policy and operation; apathy

Continued work with the National Guard Bureau to help them realize there are specific environmental concerns will help the States when plans and projects are submitted

Large number of facilities (2,000 National Guard locations) to accommodate units as small as one company

Review of economic analysis at Fort Hood does not show the large savings indicated

Type of soil

Degree of cleanliness required by each commander

Use of maintenance facility as a wash facility

5. Are there other process modifications with the potential to improve productivity and/or reduce waste generation that you hope to see implemented?

Refinements/improvements in ways to deal with treatment of stormwater from nonpoint sources. It is difficult to justify the expense when the drainage systems are not carrying pollutants off-post, but the installation is still polluting itself.

Recycling of wash water at our tracked vehicle washrack

DELP has shown some important projects

Solvent distilling

More use of used oils and lubricants as fuel in boiler plants and waste heat incinerators

Use of nonhazardous solvents and solvent recycle

Appoint responsible personnel to be held accountable before troops use facility; ban detergents and solvents; trash control; scheduled clean-up of grounds

Centralized scheduled maintenance facility rather than one for each motor pool. One-stop facility for oil change and undercarriage and engine compartment cleaning

Develop a detergent for use with a steam cleaner or hot water washer that will not defeat the common oil/water separator

Quiescent grit/oil separators without baffle plates

Design facilities for gravity flow to eliminate the majority of pumps

No real need for such facilities at Tooele Army Depot

6. What methods of information/technology transfer do you think would have the greatest chance for success in helping to spread process improvements and new technologies?

Additional workshops, seminars, conferences (6)

Additional conferences at other locations (Forts Polk, Hood, and/or Carson) which afford a direct exchange of information regarding lessons learned with a given design or type of facility

Distribution of videotapes to DEHs (Directorates of Engineering and Housing) about this technology

A newsletter, letters, or pamphlets sent directly to attendees of this conference (2)

Target information to the people who usually do the project development

Meetings like this one pointed more at the "doers"

Educate personnel who implement policy changes in the use of the technology

Network of wash facilities users to exchange process modifications

Need to involve maintenance personnel. If they are sold, they will use it.

Far more meetings between environmental and engineering staff DOD-wide to share successes and problems

Better communication between the user and designer of a system

CERL to assist in sizing and planning

Representatives from CERL, FESA, MACOMs, DA, OCE, etc. (i.e., those who know what's going on) should come to installations and make presentations.

More onsite workshops with more representatives from logistics areas -- tailor pitch to that facility

7. Other comments?

The paint stripping presentation was very worthwhile.

It was a very good program. Better or earlier notification would have been helpful.

Make sure that you are at the world-wide engineering conference in Cincinnati in December.

DOD involvement in this area will have a far-reaching effect on the Army program.

Mechanics don't think that the high-pressure, low-volume, hot water washing of engines, etc., gets the equipment as clean as they would like.

Good operation and maintenance instructors and training are needed.

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